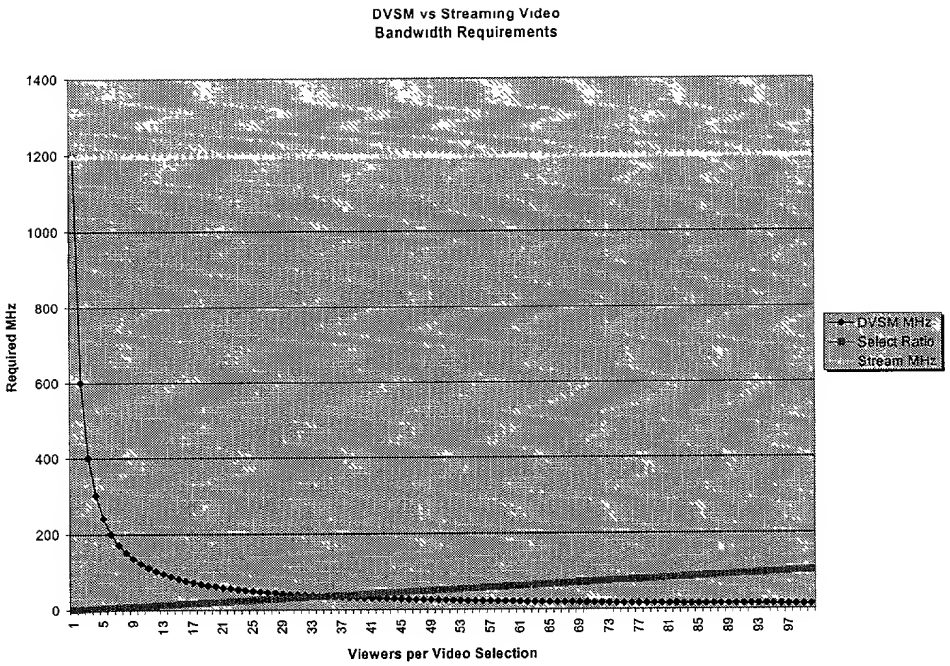


Figure 1 - Bandwidth Requirements

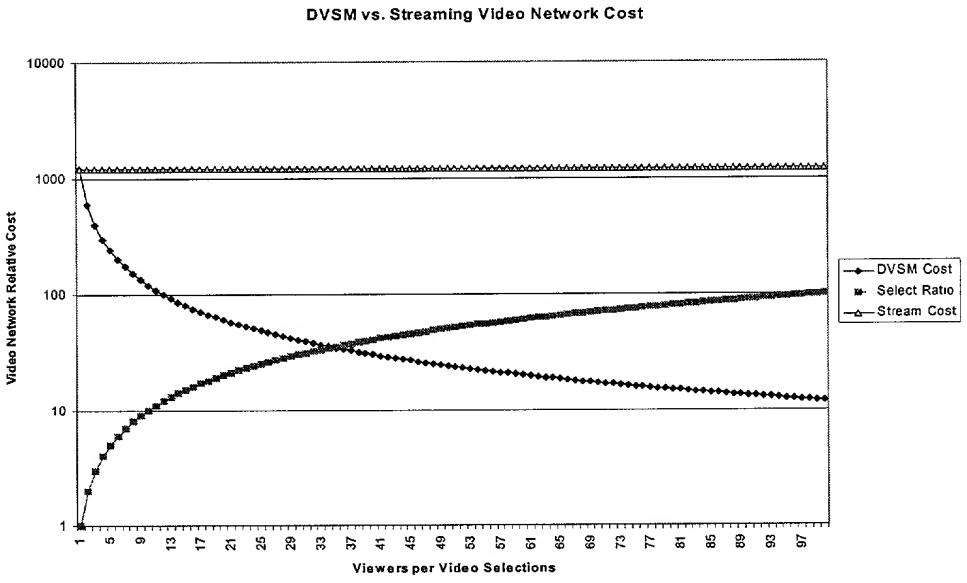


Figure 2 - Logarithmic Cost Relationship

Time	User 1	User 2	User 3	User 4	User 5	User 6	User 7	User 8	User 9	User 10
T^1	V^{1s1}				V^{2s1}		V^{1s1}			V^{3s1}
T^2	V^{1s2}	V^{1s1}/V^{1s2}		V^{2s1}/V^{2s2}	V^{2s2}		V^{1s2}			V^{3s2}
T^3	V^{1s3}	V^{1s3}		V^{2s3}	V^{2s3}		V^{1s3}	V^{3s1}		V^{3s3}
T^4	V^{1s4}	V^{1s4}	$V^{1s1}/V^{1s2}/V^{1s3}$	V^{2s4}	V^{2s4}		V^{1s4}	V^{3s2}/V^{3s3}		V^{3s4}
T^5	V^{1s5}	V^{1s5}	$V1^{s4}/V^{1s5}$	V^{2s5}	V^{2s5}		V^{1s5}	V^{3s4}/V^{3s5}		V^{3s5}
T^6	V^{1s6}	V^{1s6}	V^{1s6}	V^{2s6}	V^{2s6}		V^{1s6}	V^{3s6}	V^{3s1}	V^{3s6}
T^7	V^{1s7}	V^{1s7}	V^{1s7}	V^{2s7}	V^{2s7}		V^{1s7}	V^{3s7}	V^{3s2}/V^{3s3}	V^{3s7}
T^8	V^{1s8}	V^{1s8}	V^{1s8}	V^{2s8}	V^{2s8}		V^{1s8}	V^{3s8}	V^{3s4}/V^{3s5}	V^{3s8}
T^9	V^{1s9}	V^{1s9}	V^{1s9}	V^{2s9}	V^{2s9}	$V^{1s1}/V^{1s2}/V^{1s3}$	V^{1s9}	V^{3s9}	V^{3s6}/V^{3s7}	V^{3s9}
T^{10}	V^{1s10}	V^{1s10}	V^{1s10}	V^{2s10}	V^{2s10}	V^{1s4}/V^{1s5}	V^{1s10}	V^{3s10}	V^{3s8}/V^{3s9}	V^{3s10}
T^{11}	V^{1s11}	V^{1s11}	V^{1s11}	V^{2s11}	V^{2s11}	V^{1s6}/V^{1s7}	V^{1s11}	V^{3s11}	V^{3s10}/V^{3s11}	V^{3s11}
T^{12}	V^{1s12}	V^{1s12}	V^{1s12}	V^{2s12}	V^{2s12}	V^{1s8}/V^{1s9}	V^{1s12}	V^{3s12}	V^{2s12}	V^{3s12}
T^{13}	V^{1s13}	V^{1s13}	V^{1s13}	V^{2s13}	V^{2s13}	V^{1s10}/V^{1s11}	V^{1s13}	V^{3s13}	V^{2s13}	V^{3s13}
T^{14}	V^{1s14}	V^{1s14}	V^{1s14}	V^{2s14}	V^{2s14}	V^{1s12}/V^{1s13}	V^{1s14}	V^{3s14}	V^{2s14}	V^{3s14}
T^{15}	V^{1s15}	V^{1s15}	V^{1s15}	V^{2s15}	V^{2s15}	V^{1s14}/V^{1s15}	V^{1s15}	V^{3s15}	V^{2s15}	V^{3s15}
T^{16}	V^{1s16}	V^{1s16}	V^{1s16}	V^{2s16}	V^{2s16}	V^{1s16}	V^{1s16}	V^{3s16}	V^{2s16}	V^{3s16}
T^{17}	V^{1s17}	V^{1s17}	V^{1s17}	V^{2s17}	V^{2s17}	V^{1s17}	V^{1s17}	V^{3s17}	V^{2s17}	V^{3s17}
T^{18}	V^{1s18}	V^{1s18}	V^{1s18}	V^{2s18}	V^{2s18}	V^{1s18}	V^{1s18}	V^{3s18}	V^{2s18}	V^{3s18}
T^{19}	V^{1s19}	V^{1s19}	V^{1s19}	V^{2s19}	V^{2s19}	V^{1s19}	V^{1s19}	V^{3s19}	V^{2s19}	V^{3s19}
T^{20}	V^{1s20}	V^{1s20}	V^{1s20}	V^{2s20}	V^{2s20}	V^{1s20}	V^{1s20}	V^{3s20}	V^{2s20}	V^{3s20}

Figure 3 - Dynamic Multicasting

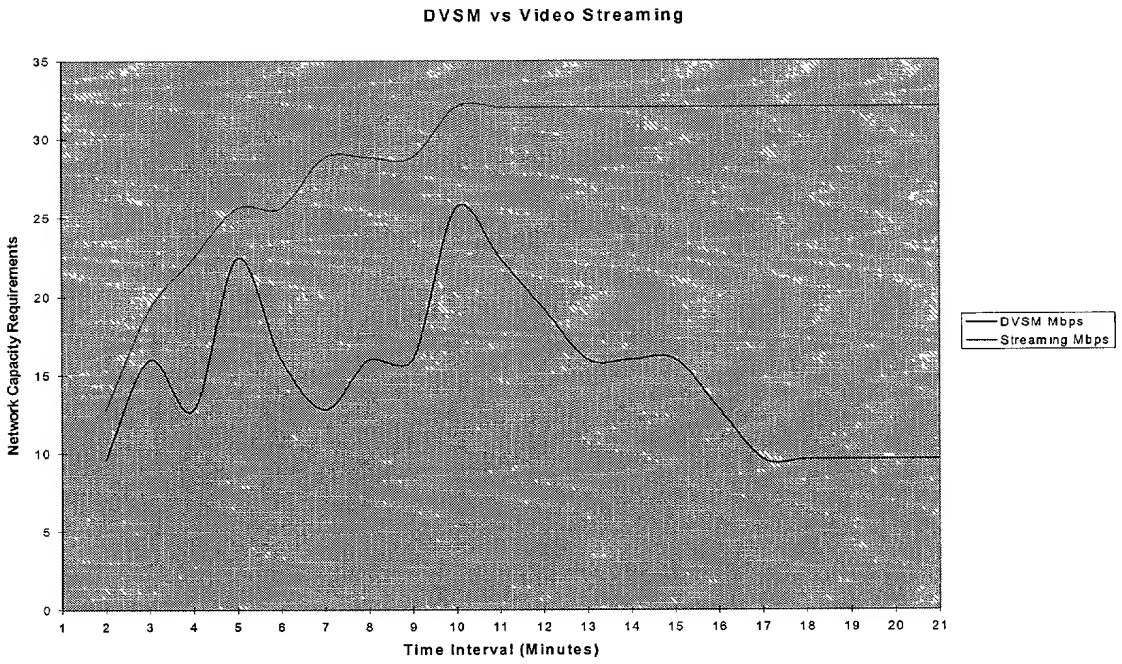
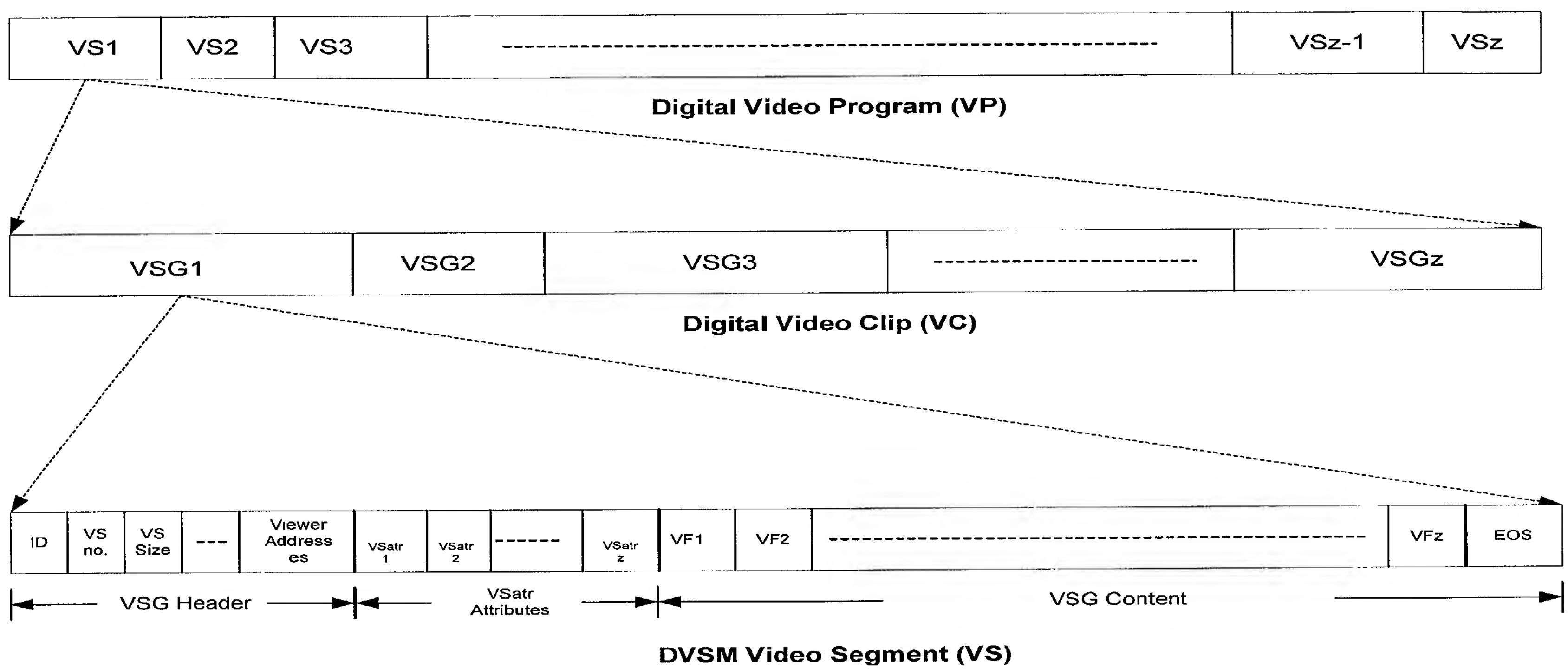


Figure 4 - Bandwidth Capacity Comparison **

** In Figure 4 the top line is video streaming and the bottom line is DVSM. The Delta between the video streaming line and the DVSM line is the bandwidth capacity saving achieved by using DVSM technology.



VS -- Video Scene

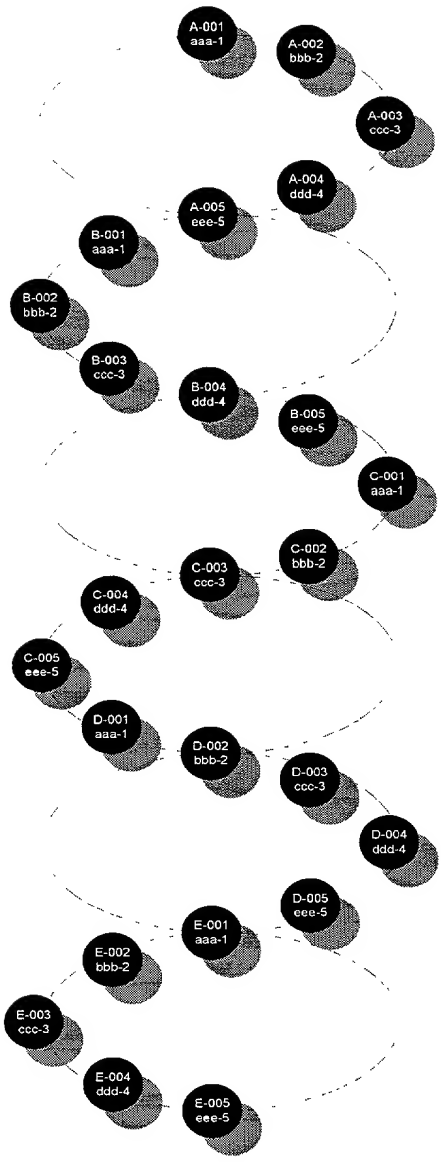
VSG -- Video Segment

VF -- Video Frame

VSatr -- Video Segment Attribute

EOS - End Of Segment

Figure 5(a) - DVSM Format



Code	Flag	Tag	Mark	Function
"A"	001	aaa	User 1	X - Off
"A"	002	bbb	User 2	R - Off
"A"	003	ccc	User 3	PG 13 - Off
"A"	004	ddd	User 4	PG - Off
"A"	005	eee	User 5	NR - Off
"B"	001	aaa	User 1	if: a>x=1<y3.2
"B"	002	bbb	User 2	if: a>x=1<y3.2
"B"	003	ccc	User 3	if: a>x=1<y3.2
"B"	004	ddd	User 4	if: a>x=1<y3.2
"B"	005	eee	User 5	if: a>x=1<y3.2
"C"	001	aaa	User 1	x=01 y=01 link
"C"	002	bbb	User 2	x=01 y=01 link
"C"	004	ccc	User 3	x=01 y=01 link
"C"	004	ddd	User 4	x=01 y=01 link
"C"	005	eee	User 5	x=01 y=01 link
"D"	001	aaa	User 1	1, 2...(z-1).dvs
"D"	002	bbb	User 2	1, 2...(z-1).dvs
"D"	003	ccc	User 3	1, 2...(z-1).dvs
"D"	004	ddd	User 4	1, 2...(z-1).dvs
"D"	005	eee	User 5	1, 2...(z-1).dvs
"E"	001	aaa	User 1	link=\www.*.*
"E"	002	bbb	User 2	link=\www.*.*
"E"	003	ccc	User 3	link=\www.*.*
"E"	004	ddd	User 4	link=\www.*.*
"E"	005	eee	User 5	link=\www.*.*

1 Flags, tags, marks and codes are the attributes used to provide the system the appropriate instructions that will allow for individualized "Microcasting" sessions

2. In this illustration codes are used to designate specific functions. For example, based on movie rating code "A" designates an "off" function Normally the system operates on an exception basis, therefore only "off" authorizations are needed. "B" is the bit rate i.e., 1 0, 1 6 or 3 2 Mbps. "C" designates the actions to be taken regarding Icons located within the video segment. "D" are destination codes for advertising and "E" are the actions associated with interactive elements within the segment.

3. Each code will have its own set of flags, tags and marks i e., individuals within the household can be identified by designated marks. Legends for these flags, tags and marks are easily created in a plurality of combinations.

Figure 5(b) - DVSM Attributes

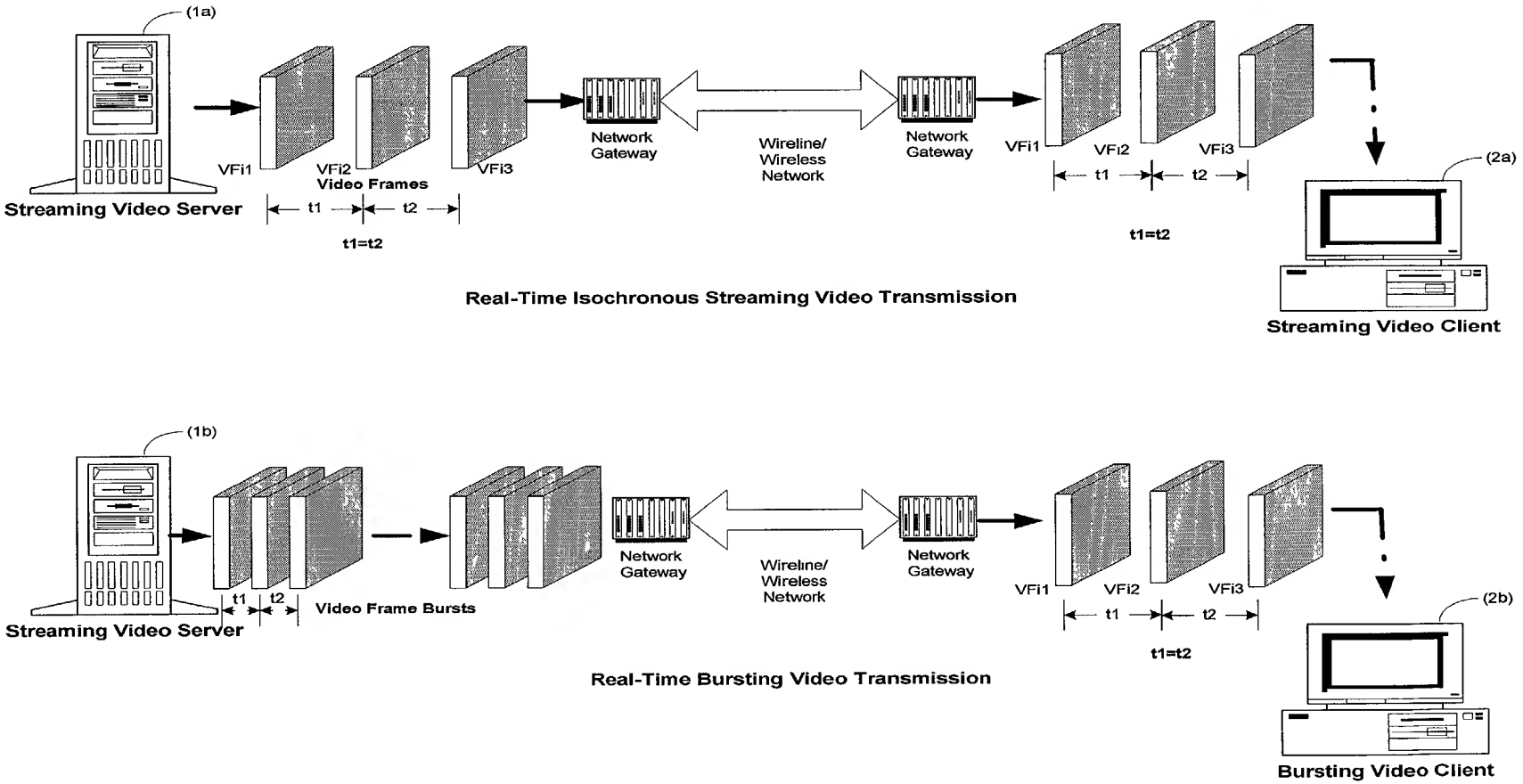


Figure 6(a) - Streaming & Bursting Video Frames Transmission

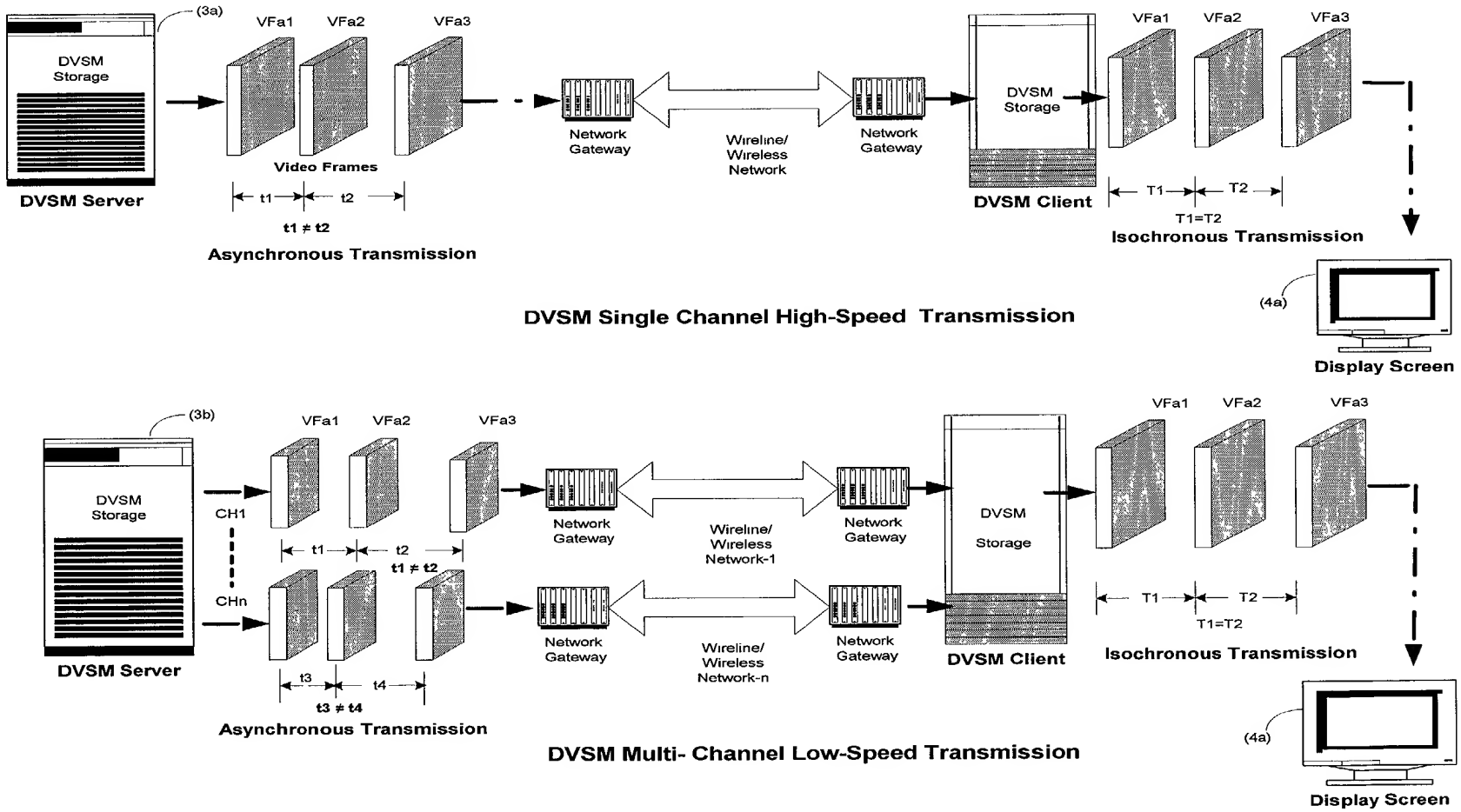


Figure 6(b) - DVSM High Speed & Low Speed Video Transmission

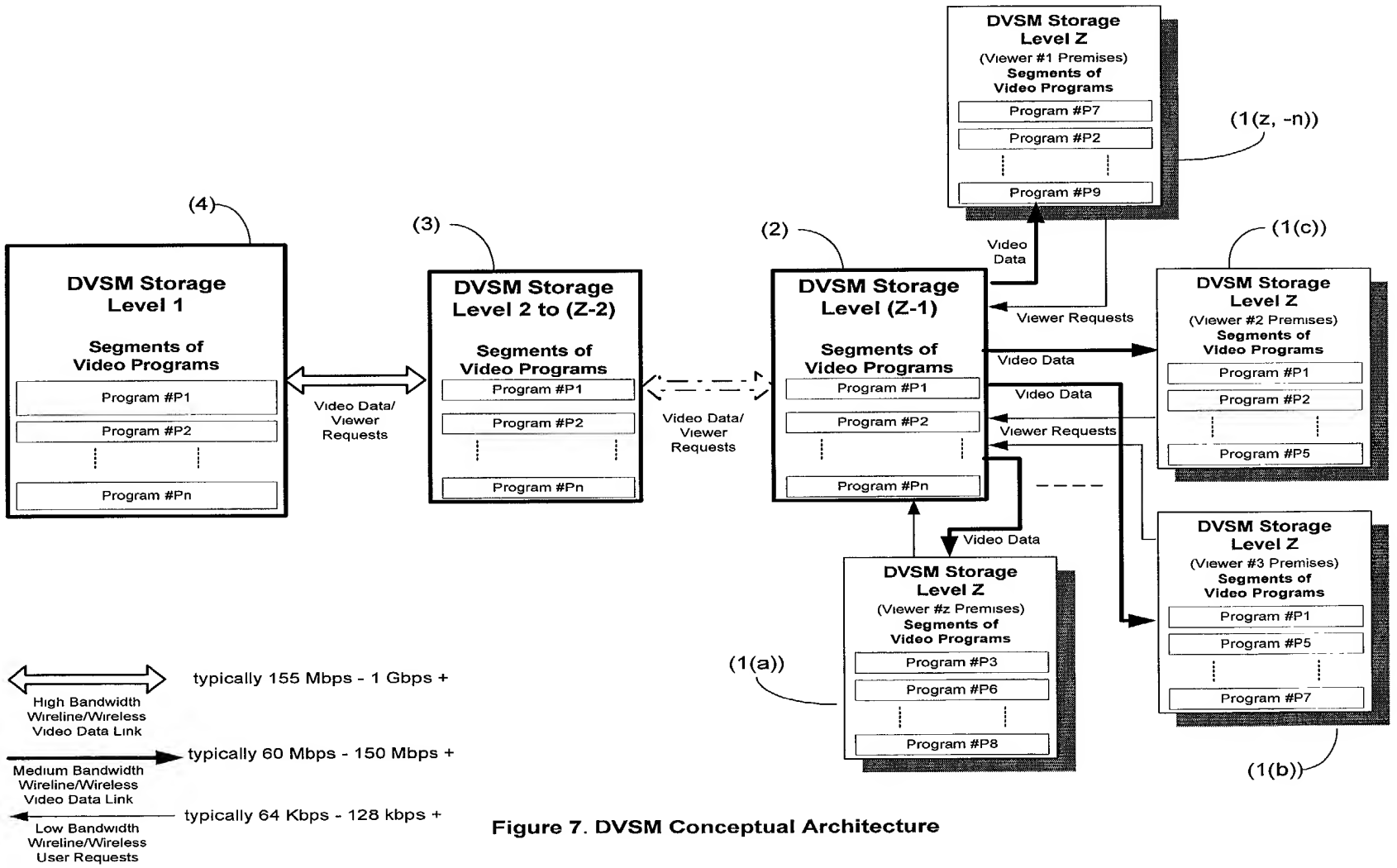
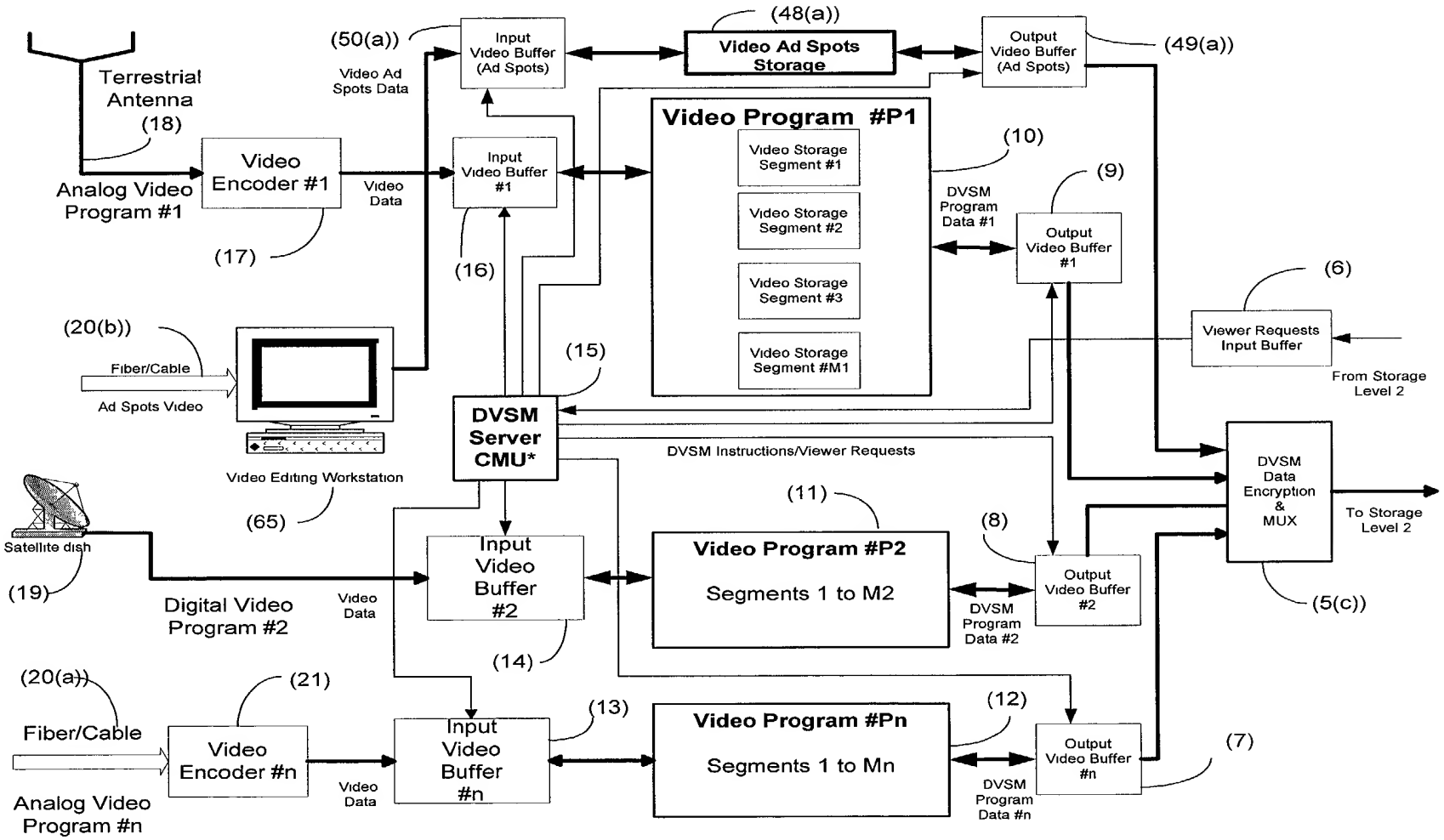
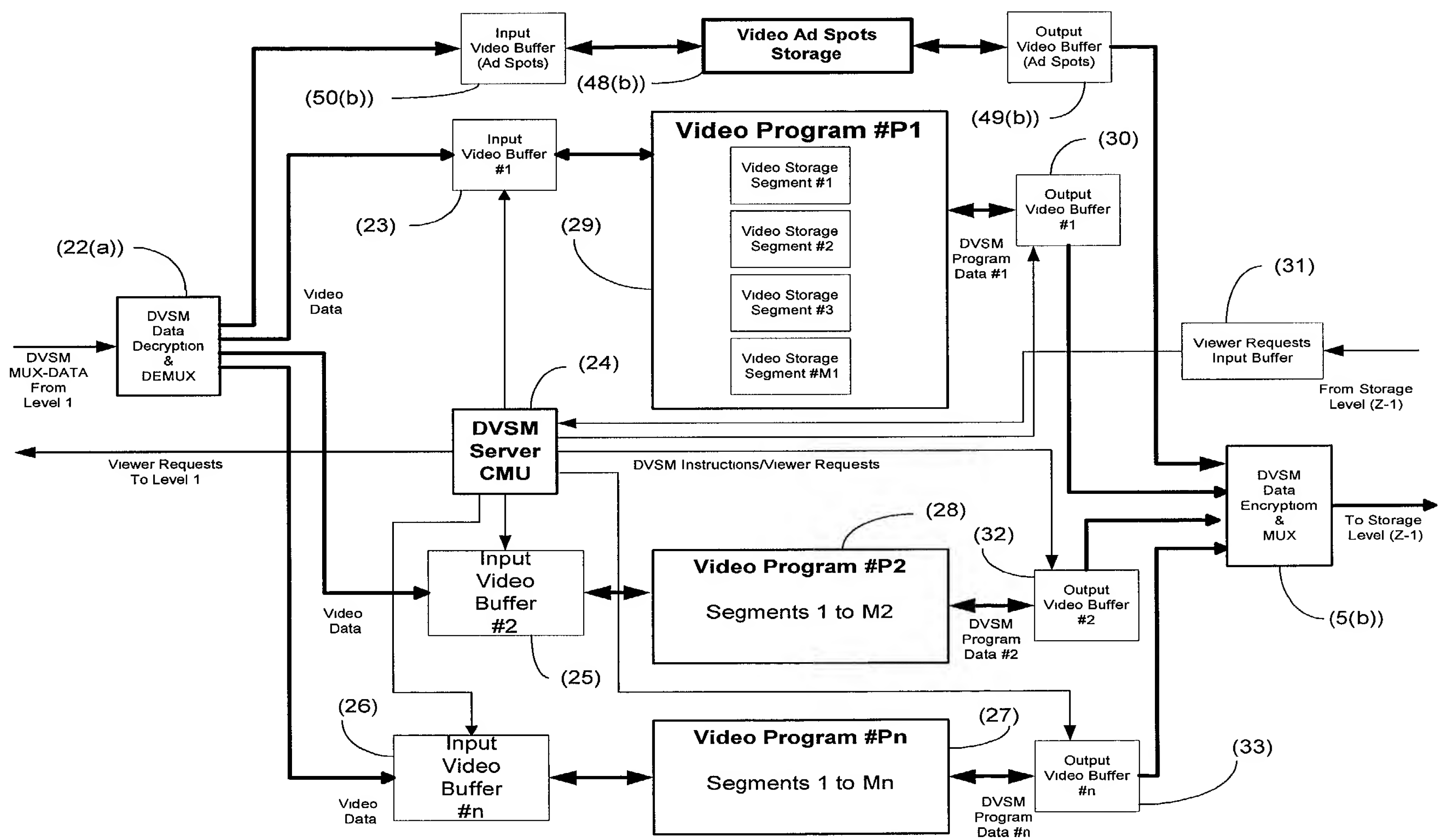


Figure 7. DVSM Conceptual Architecture



***CMU** - Control & Management Unit

Figure 8. DVSM Data Storage Level 1



Input Video Buffer (Ad Spots)
Video Ad Spots Storage
Output Video Buffer (Ad Spots)
(50(b))
(48(b))
(49(b))
Input Video Buffer #1
Video Program #P1
Video Storage Segment #1
Video Storage Segment #2
Video Storage Segment #3
Video Storage Segment #M1
Output Video Buffer #1
(30)
(23)
(29)
DVSM Program Data #1
(22(a))
DVSM Data Decryption & DEMUX
Video Data
DVSM MUX-DATA From Level 1
(31)
Viewer Requests Input Buffer
From Storage Level (Z-1)
(24)
DVSM Server CMU
Viewer Requests To Level 1
DVSM Instructions/Viewer Requests
DVSM Data Encryptiom & MUX
To Storage Level (Z-1)
(28)
(32)
Input Video Buffer #2
Video Program #P2
Segments 1 to M2
Output Video Buffer #2
Video Data
DVSM Program Data #2
(5(b))
(25)
(26)
(27)
(33)
Input Video Buffer #n
Video Program #Pn
Segments 1 to Mn
Output Video Buffer #n
Video Data
DVSM Program Data #n

Figure 9. DVSM Data Storage Levels 2 to (Z-2)

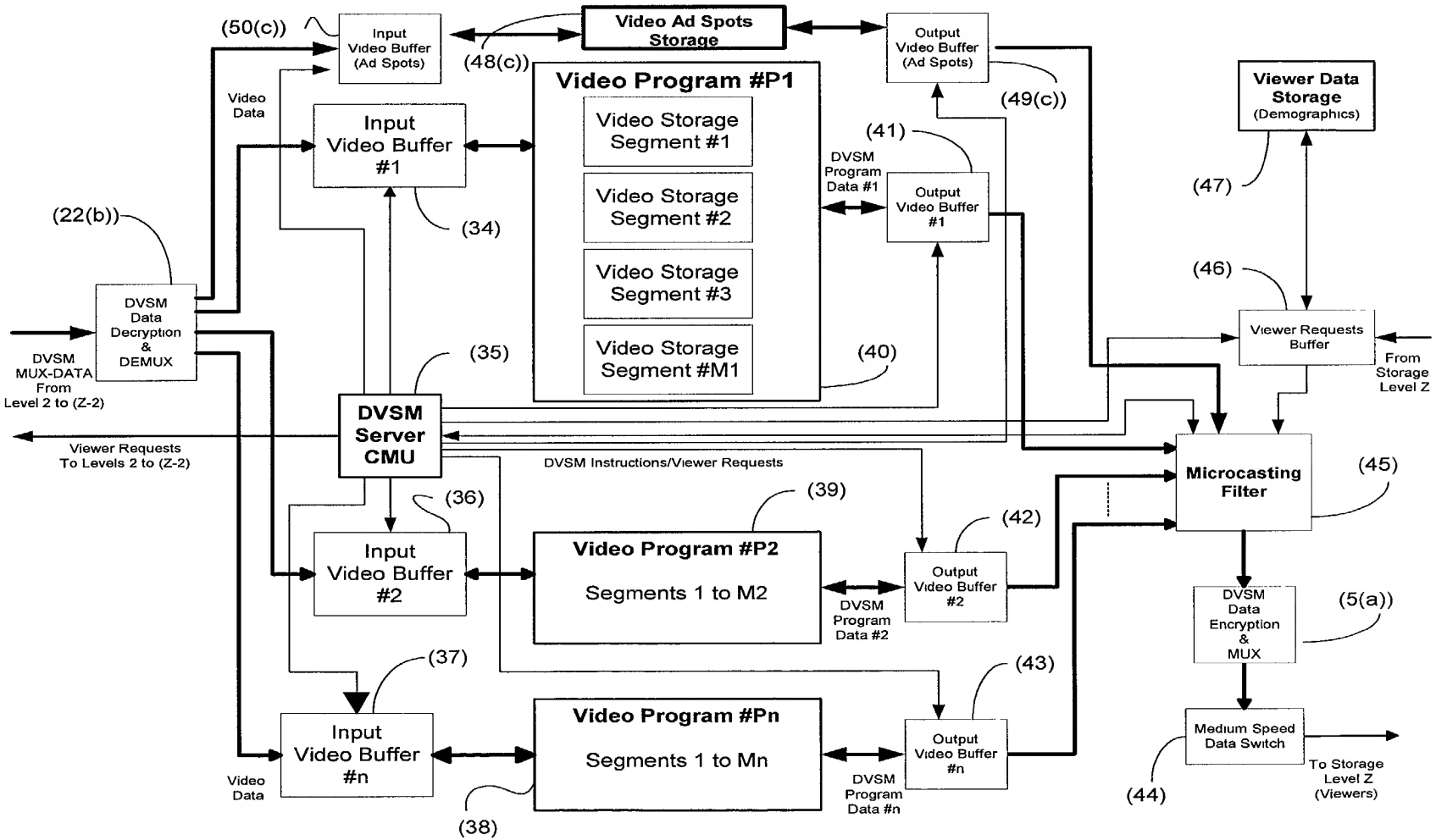


Figure 10. DVSM Data Storage Level (Z-1)

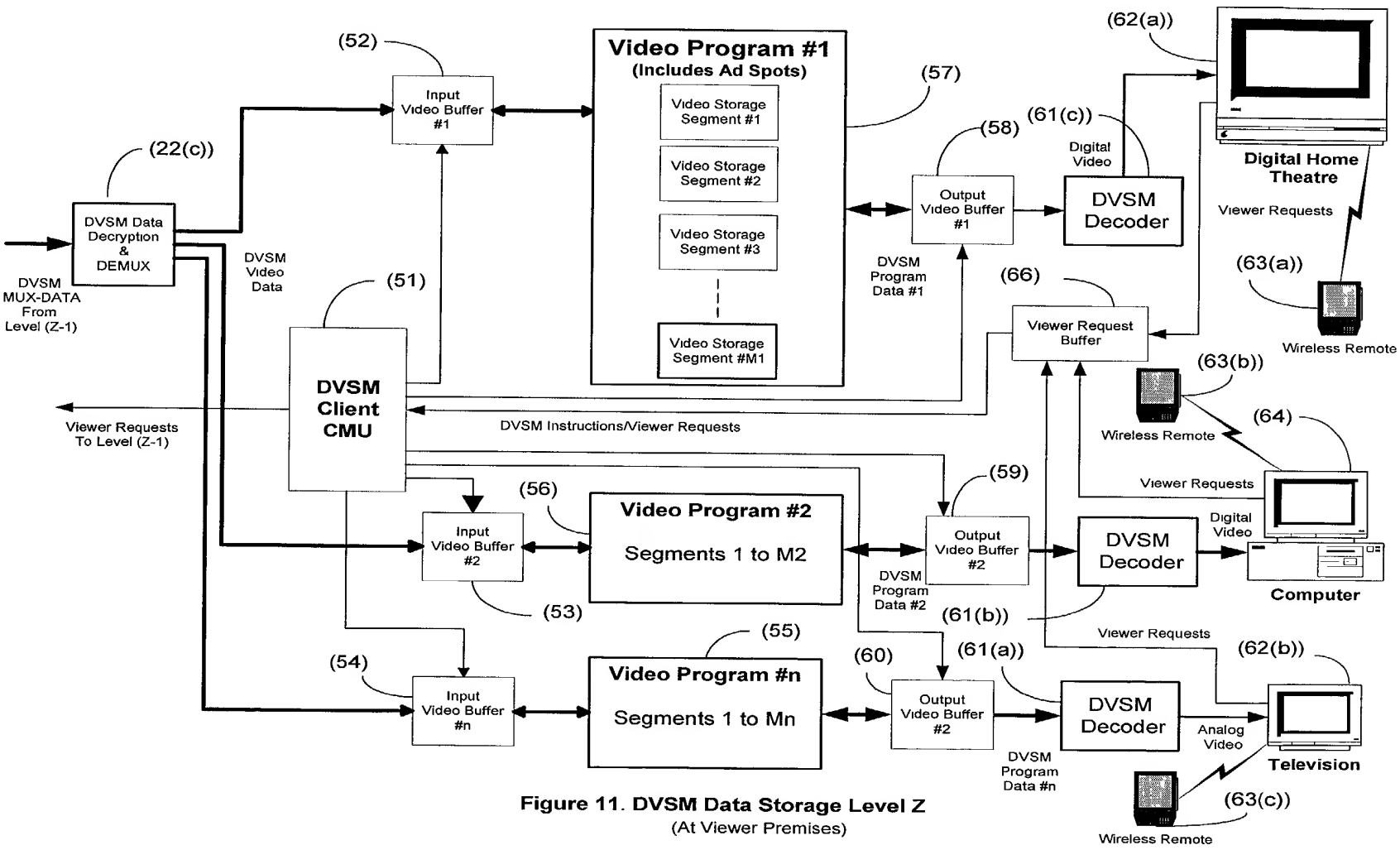


Figure 11. DVSM Data Storage Level Z
(At Viewer Premises)

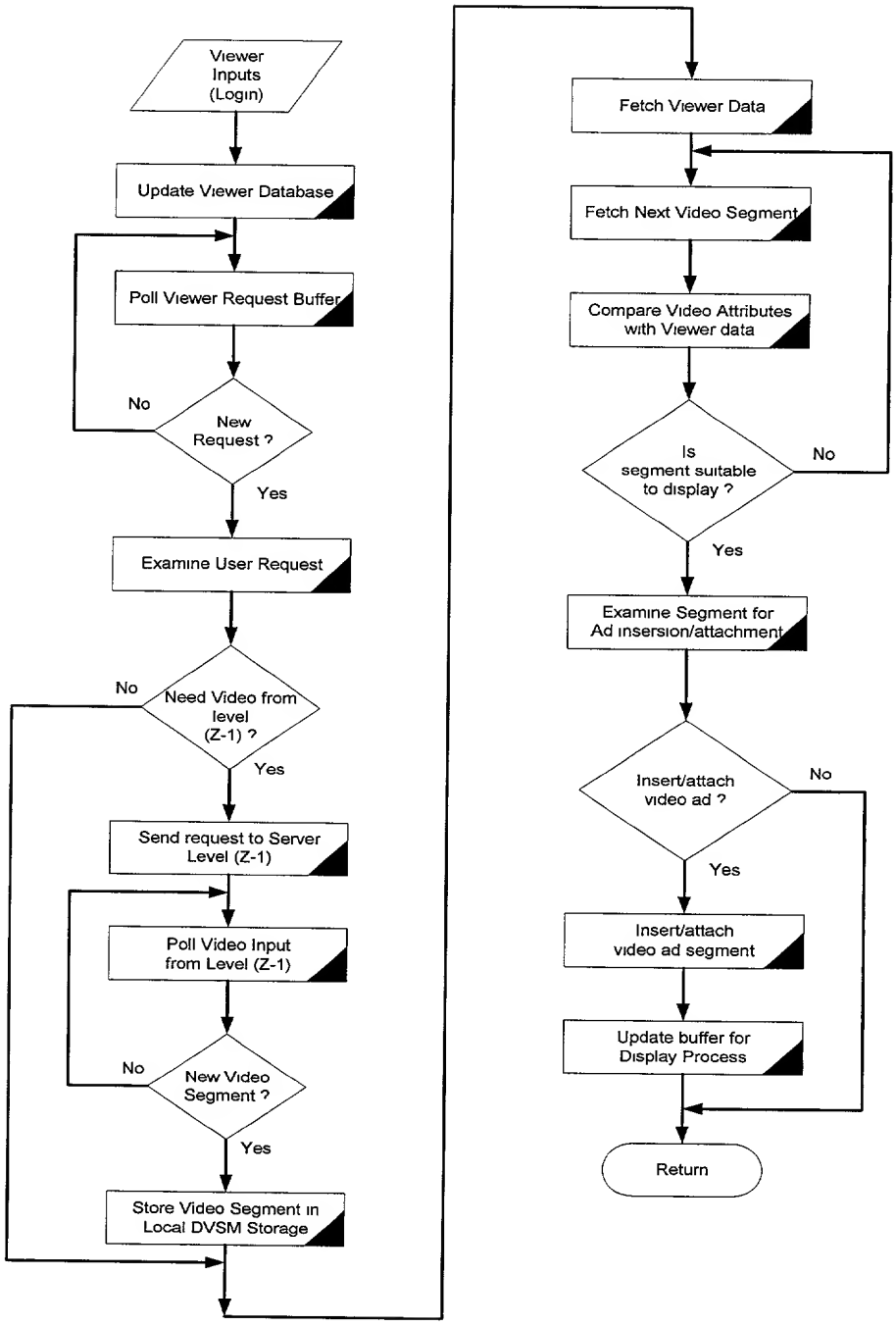


Figure 12 DVSM Microcasting Algorithm

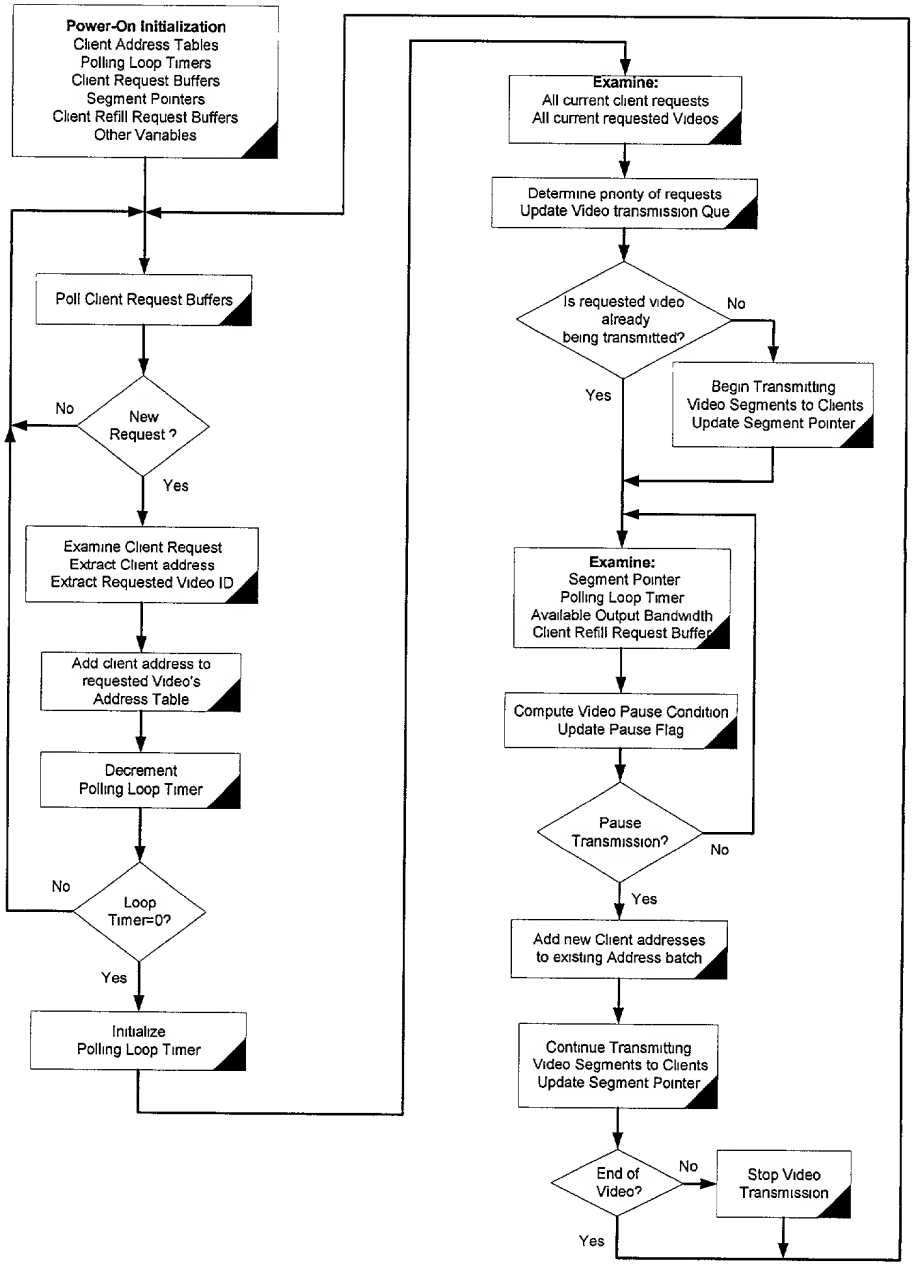


Figure 13 DVSM Multicasting Algorithm

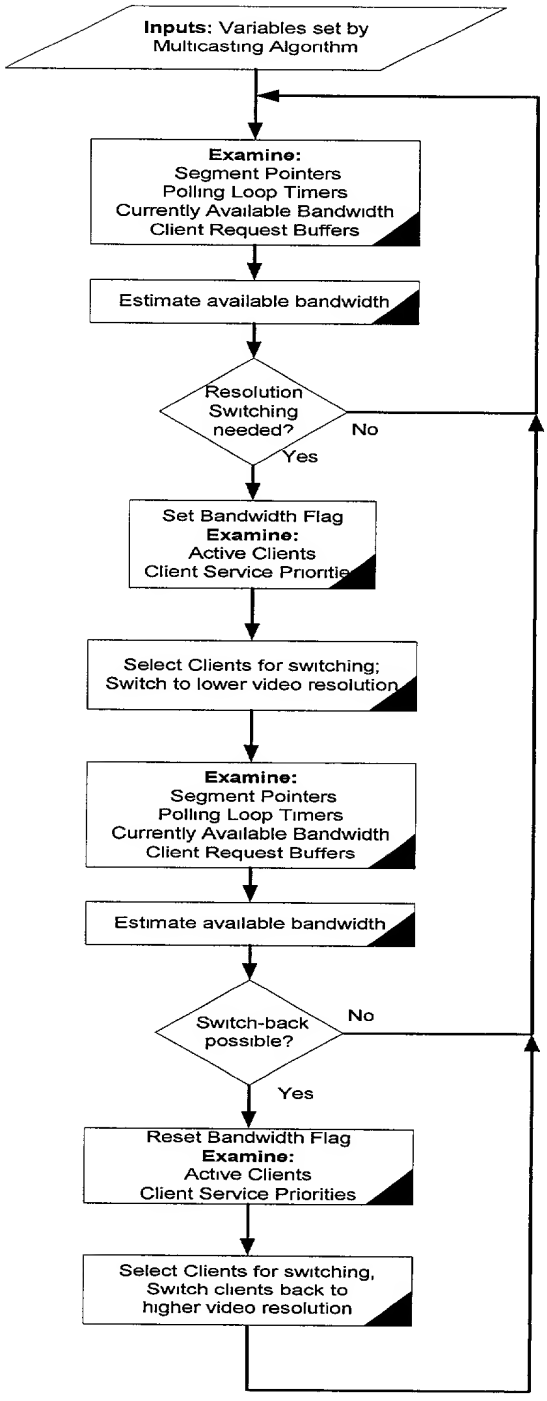


Figure 14 Dynamic Resolution Switching (DRS) Algorithm

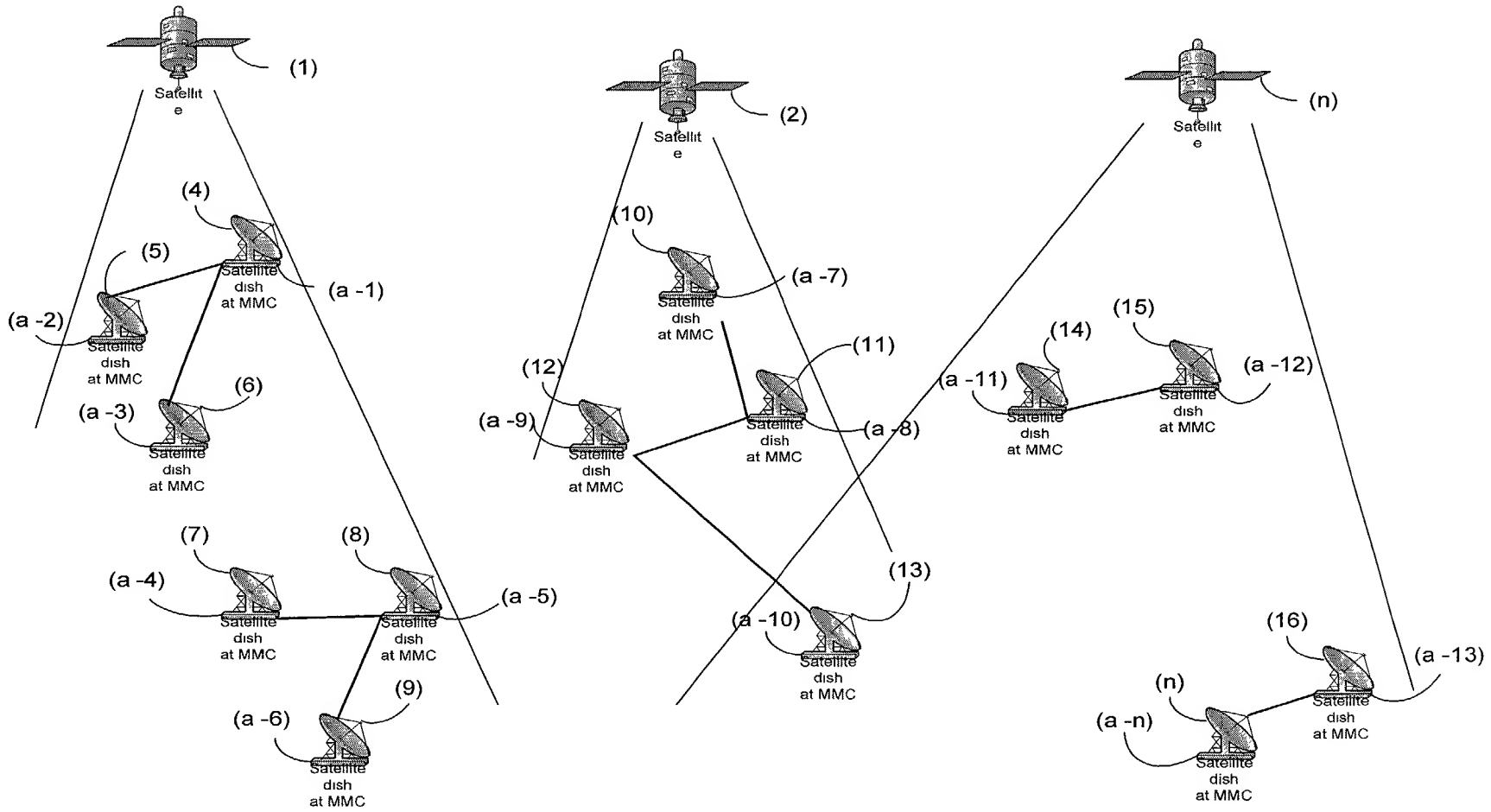


Figure 15 - Global DVSM Network Architecture

MMC - Metro Media Center

——— Fiber Link

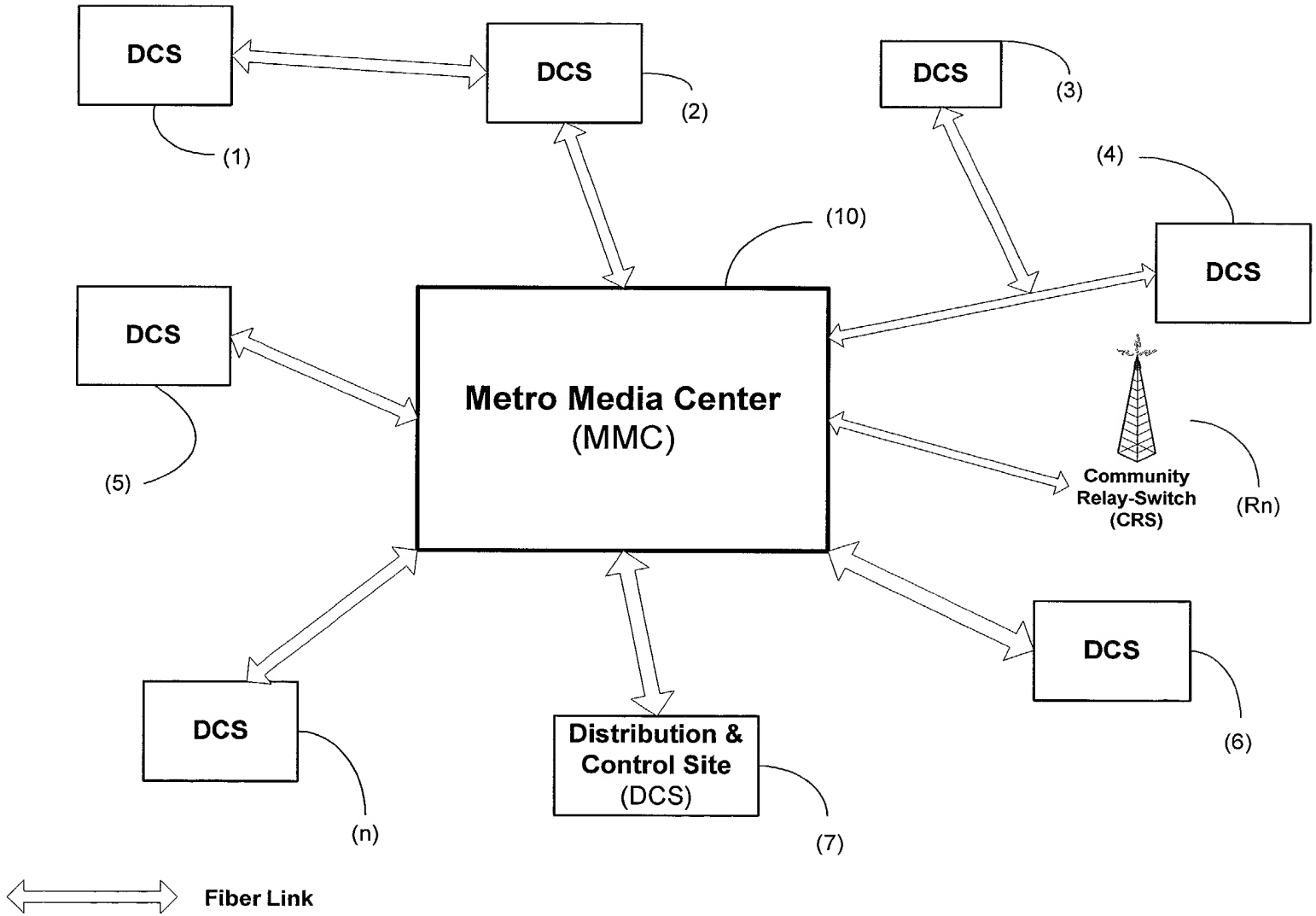


Figure 16 - Metro DVSM Network Architecture

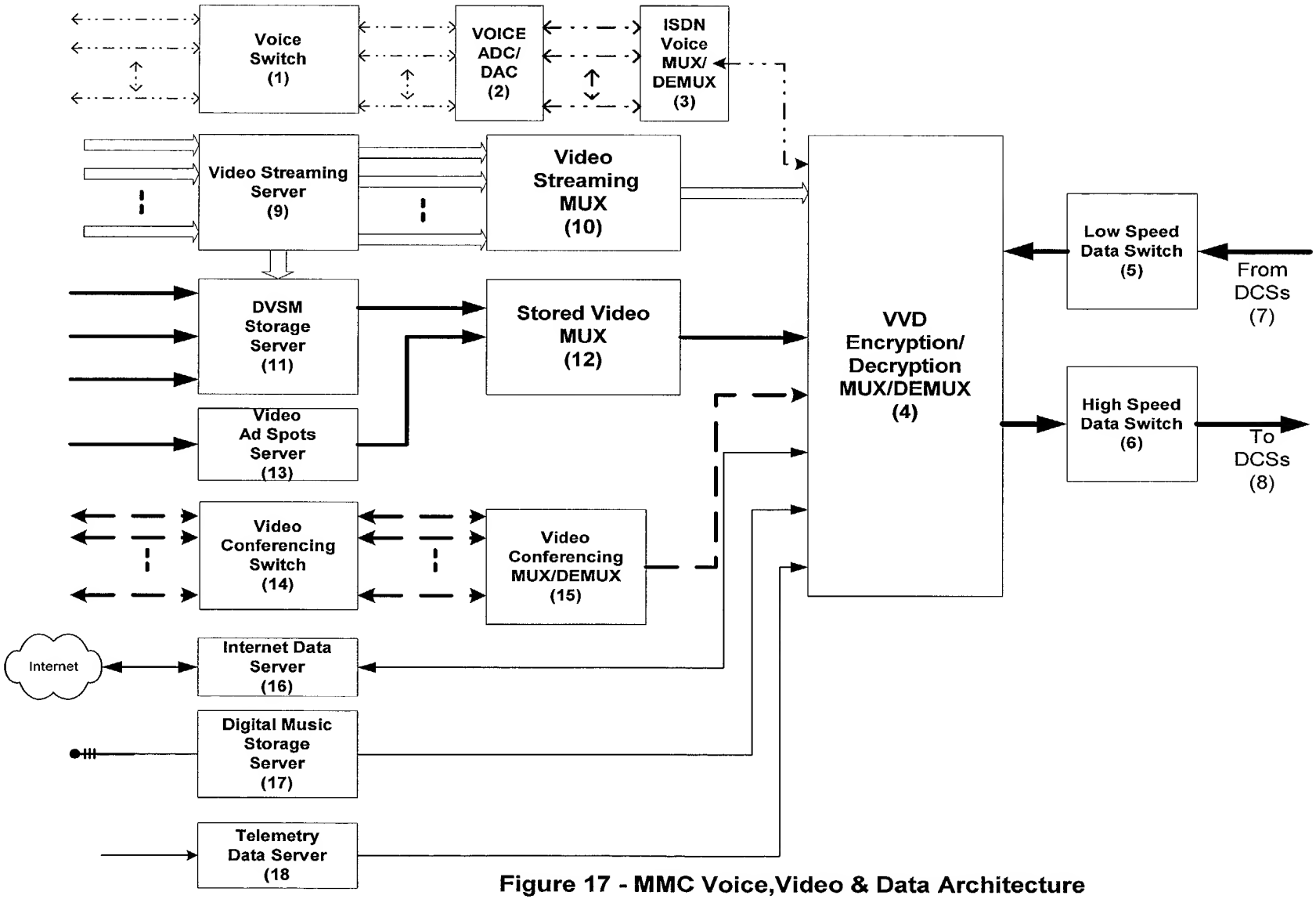


Figure 17 - MMC Voice,Video & Data Architecture

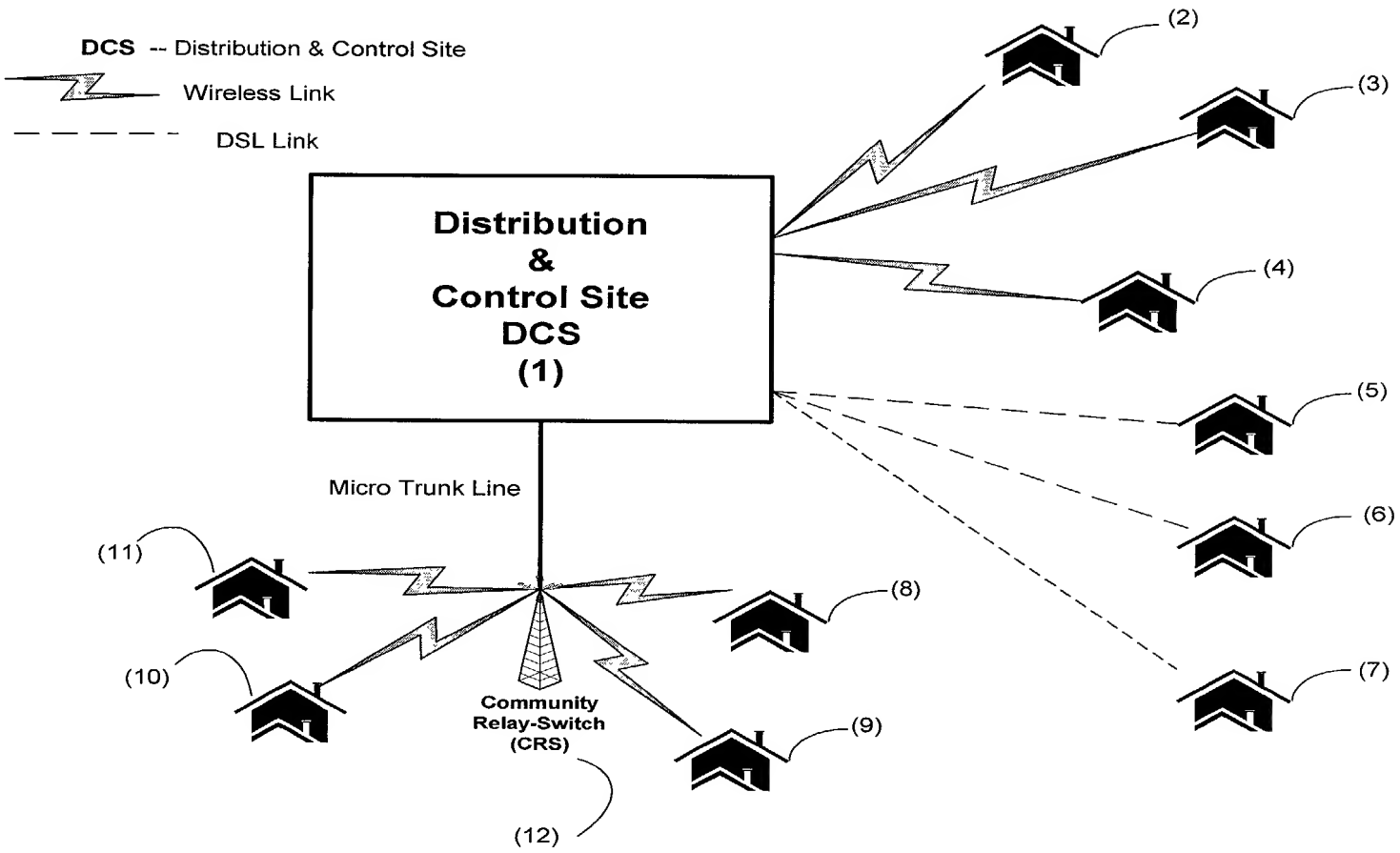


Figure 18 - Community DCS DVSM Architecture

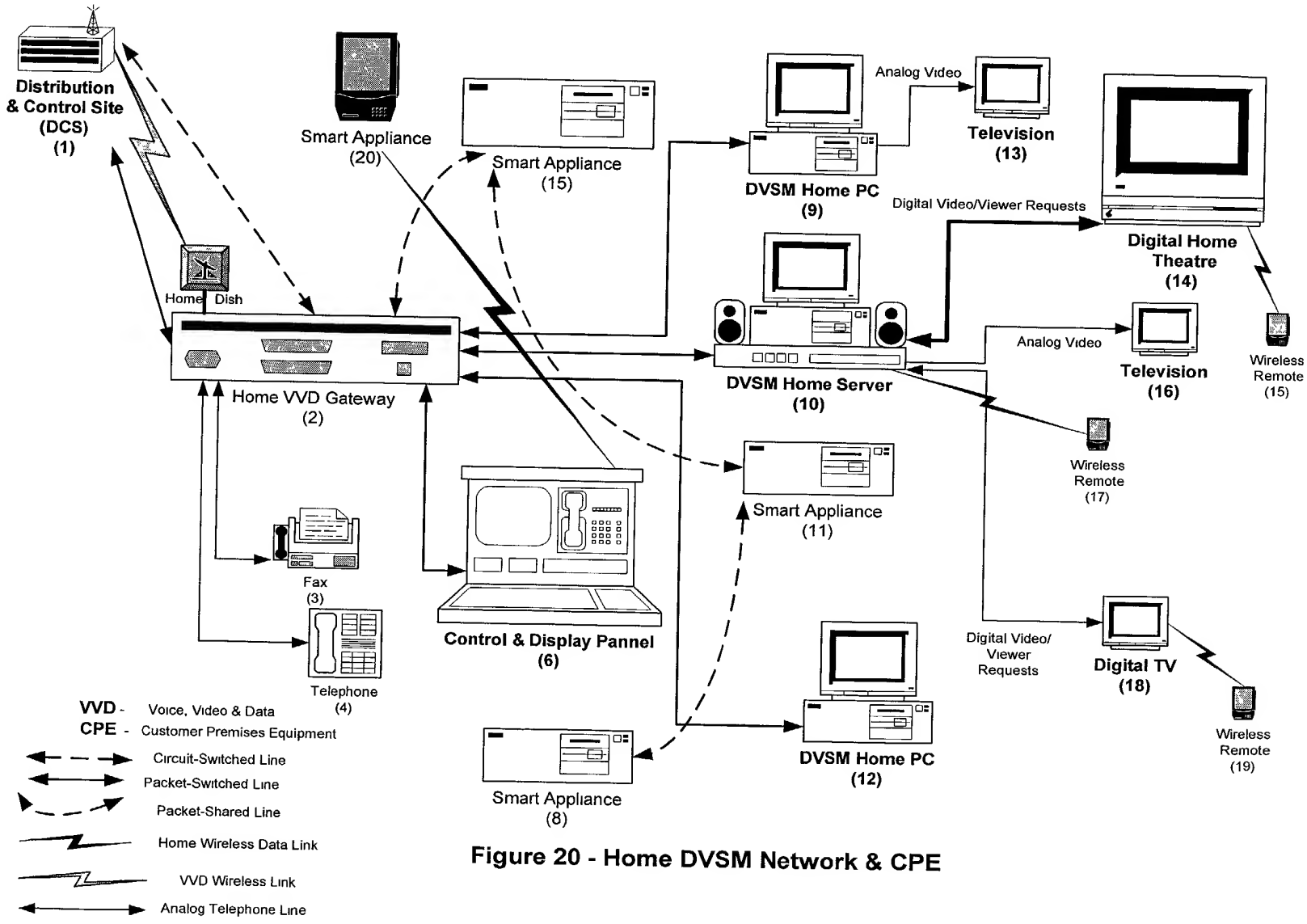


Figure 20 - Home DVSM Network & CPE